Reducing queues: demand and capacity variations

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Abstract

Purpose - To investigate how waiting lists or queues could be reduced without adding more resources; and to describe what factors sustain waiting-time reduction.

Method - Cases were selected according to successful and sustained queue reduction. The approach in this study is action research.

Limitations - Results should be viewed cautiously. Transferring and generalising outcomes from this study is for readers to consider. However, accessible healthcare may be possible by paying more attention to existing solutions.

Practical implications - Accessibility improved as out-patient waiting lists for two clinics were reduced. The key success element was to work towards matching demand and capacity. It has been possible to sustain the improvements. This study indicates that queue reduction activities should include acquiring knowledge about theories and methods to improve accessibility, finding ways to monitor varying demand and capacity, and to improve patient processing by reducing variations.

Value - Accessibility is considered an important dimension when measuring service quality. However, there are few articles on how clinic staff have reduced waiting lists and sustained change. This article contributes accessible knowledge to the field.

Keywords - Care pathways, Efficiency, Lean Thinking, Management, Organisational change, Process management, Sweden

Paper type Case study

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Background

Accessibility is considered by many experts to be an important service quality dimension and at the same time a never-ending dilemma for several healthcare providers (Institute of Medicine, 2001). One important health service accessibility characteristic concerns patient queues or waiting lists for treatment. Waiting lists in principal are simple – they include patients with valid needs for care that is yet to (completely) start (Kenis, 2006). Waiting lists often develop when there is an imbalance between healthcare demand and supply (Kenis, 2006), or in another words, a mismatch between demand and capacity. They are a more common feature among publicly funded healthcare services (Foote *et al.*, 2004).

There are many unsupported healthcare sector misconceptions about how to approach and manage queuing problems (Silvester *et al.*, 2004). A common argument is that demand in general is greater than capacity and this is the reason for queuing. But if the demand is greater than capacity then the waiting-list will grow indefinitely. In actuality, waiting lists are relatively stable and growing waiting lists are fairly unusual (Silvester *et al.*, 2004). Another misconception is that queues help to make certain that costly resources are in use all the time. Authors with this perspective argue

that it is, therefore, beneficial from a productivity viewpoint, to have a queue. This is not an accurate assessment. When patients move through several activities in their clinical journey, one activity tends to be a bottleneck. This one resource governs the entire patient process output rate. Because demand varies and the bottleneck effect on capacity, it is impossible for a system to be in use all the time (Silvester *et al.,* 2004). A third argument is that queues discourage people from using scarce healthcare resources. If queues cause medical systems to appear overburdened then it is easy to understand why many clinicians believe waiting lists remain their last protection from what see as unreasonable demands - instead of trying to understand the actual causes behind queuing problems (Silvester *et al.,* 2004). In practice, publicly funded healthcare providers usually establish criteria that describe which patients to treat and which to refer to primary care or different specialist. Unless there is more illness or a medical treatment breakthrough, a large increase is unlikely. Moreover, most healthcare capacity plans are based on average activity. This approach does not, in general, relate to demand and it does not consider capacity variation. In contrast, it is the variation in the way capacity is managed in healthcare systems that causes queuing (Silvester *et al.,* 2004).

With these commonly described misconceptions in mind, the most understandable and frequent approach towards dealing with waiting times is to allocate more resources. However, it is apparent that this option is unsustainable owing to medical-technological developments and changing demographics. Both factors generate demand, which grows faster than funding and productivity. As a second consideration, adding more resources will not improve accessibility and decrease queuing (Kenis, 2006). Rather, there is a need to understand the mechanism behind queuing; the mismatch between capacity and demand.

There are, however, few published reports in research journals concerning healthcare accessibility in general compared to other important service quality dimensions (Perneger, 2008). The operations management field, which deals with, among others, accessibility issues and queue theory, is a large research area that is often applied in other industries (Shmenner and Swink, 1988; Åhlström, 2004; Johnston and Clark, 2008), but yet to be discovered by many healthcare managers. A unique and comprehensive literature overview on outpatient scheduling in healthcare was, however, performed by Cayirli and Veral (2003). Publications were classified in three ways: analytical; simulation; and case studies. The authors conclude that despite many theoretical studies, the impact on outpatient clinics is limited and that the main goal for future research should be to close this gap between theory and practice. Recently, some examples about introducing lean principles into a healthcare system have been published (Lodge and Bamford, 2007; Kollberg *et al.,* 2007) as a solution to eliminate waiting lists. Nolan *et al.* (1996), Institute of Healthcare Improvement (IHI) (2003) and Walley *et al.,* (2006) are more practical articles on how to reduce queues in healthcare. The IHI authors say that the improvement process could be: evaluating flow - how many times do you get it right; measuring and understanding flow variation; and testing changes to improve flow.

The lack of published papers on accessibility could be because practice and implementation is complex (Kenis, 2006). Hence, our purpose is to describe how waiting lists can be reduced without using the most common solution - adding more resources and to describe what factors are important for sustaining success. Our study focused on the Sahlgrenska University Hospital outpatient specialist clinic.

Context

The Swedish healthcare system is decentralised compared to other countries (Molin and Johansson, 2005). Health services are managed by 20 county councils and 290 municipalities - mainly financed through county and municipal taxes. The county councils also charge patient fees, accounting for approximately three percent of all revenues. Private providers deliver about ten percent of all health

services. Costs for health and medical care amount to approximately nine percent of Sweden's gross domestic product (GDP), a fairly stable figure since the early 1980s.

Sahlgrenska University Hospital is Northern Europe's largest hospital with more than 17,000 employees, close to 2,300 beds, 165 wards and a one billion Euro budget. The hospital provides emergency and basic care for Sweden's Gothenburg region and its 700,000 inhabitants. It is responsible for highly specialised care in West Sweden where there are approximately 1.7 million inhabitants.

Excessive waiting times for pre-planned care in public facilities have long been a weakness, which has caused dissatisfaction throughout Sweden. The national government and the Federation of County Councils introduced the care guarantee in the early 1990s - an attempt to reduce waiting times for some operations. The care guarantee stipulates that patients must receive care from a nurse practitioner in a primary healthcare centre the same day and that a physician appointment must be offered within seven days. If a patient needs referring to a specialist then an appointment must be offered within three months (two weeks for cancer patients). Since 2006, the care guarantee has covered all diagnoses. However, despite its introduction, Swedish healthcare providers are not able to meet targets.

Methods

Successful and sustained queue reduction cases were selected for study. Only Sahlgrenska University Hospital clinics were chosen. Given these preconditions, two clinics met the study criteria. Additionally, neither had received extra resources to reduce their queues. The two departments were Rheumatology, and Dermatology and Venereology. Two authors led the improvement work in these departments. Together with our co-workers, we selected change strategies and carried out the improvement effort. We did not use traditional, positivistic research methods, which are often used in healthcare research. Instead, when trying to understand these problems, we agree with Kurt Levin: 'The best way to understand something is to try to change it.' (Greenwood and Levin, 2007, p.18). Improvement work in the two clinics started at different times: Rheumatology in 2001, Dermatology and Venereology in 2004. Rheumatology has 150 employees including 30 physicians who receive approximately 3,000 referrals yearly and see 17,000 outpatients annually. Dermatology and Venereology staff see approximately 33,000 outpatients yearly, including first-time and follow-up appointments - a 40/60 split. Approximately, 130 employees work at this clinic, including 30 physicians.

Results - *Rheumatology*

We used our measures to indicate improvement; i.e., 'the monthly outpatient percentage receiving their first-visit within three months from the date the referral note was sent'. If the indicator was met then the clinic staff achieved the requirement set by the care guarantee. In 2001, Rheumatology faced long waiting lists for referrals and follow-up visits. An initial assessment concluded that reasons for waiting list growth were staff shortages combined with more effective treatments for rheumatic diseases. There was a negative history when queues were eliminated and a decreased budget for the following funding cycle was a typical consequence. Department staff needed to find new strategies to reduce queuing. A multidisciplinary team was formed to increase clinic accessibility. Their first task was to describe the patient flow to, within and from the clinic. By measuring flow, a yearly increase in patients demanding regular check-ups was identified. Patients undergoing regular treatment at the clinic increased from 6,000 to 8,000 in three years. One solution was to enforce patient treatment guidelines and to set longer intervals between appointments. Other solutions were co-operation more with primary care staff and neighbouring clinics, referral assessment and scheduling re-visits to the clinic rather than to a specific physician. The team also spent a year in a

national collaborative project using 'Breakthrough Series'. This strategy involved project staff; teaching them the Breakthrough Series method and establishing several smaller groups working with plan-do-study-act (PDSA) cycles for different topics related to their daily work. All employees attended a two-day process-mapping course. These small changes gave staff a smoother and smarter daily work environment that lowered stress. Changes were measured using regular questionnaires and by monitoring improving outpatient accessibility (Figure 1). Since 2004, it is unusual for patients to wait more than three months for their first visit. This positive change contrasts sharply with the clinic situation before 2004 and the excessive waiting times among Sahlgrenska University Hospital's clinics.

One important improvement lesson was continuously measuring accessibility key factors; i.e., demand and capacity variation, analyzing statistics and taking action when necessary. The collaborating team meets five times yearly and all employees meet once yearly to exchange information. They use meetings to discuss ongoing projects, how to interpret data concerning demand variations, capacity and which changes to implement. Consequently, clinic staff are now able to pay more attention to patient safety and other quality improvement issues (Mörck, 2006).

Dermatology and Venereology

Prior to initiating improvements designed to increase outpatient service accessibility, clinic staff started quantifying the problem by getting queue overviews and monitoring demand and capacity variations. Changing demand and capacity were studied via control charts and hence they were well-known and monitored. Forecasts and analyses also used these control charts. This was later established as a continuous and systematic routine exercise. Process mapping patient pathways was used to help clinic staff understand the whole pathway and to highlight where problems occurred. Together with Chalmers University Technology Operations Management staff, an in-depth case study, including implementing improvements, was carried out at the same time that department staff participated in the Breakthrough Series programme.

Three main strategies were used in the improvement work. Clinic staff influenced demand by improving referral processes. Continuous dialogue with GPs and developing agreements about what treatment options and investigations could be carried out by GPs before sending a referral note were used to reduce referrals. This strategy also included actions such as referring patients (when justified) to their GPs with advice on how to treat the patient. When patients were referred from a hospital specialist for minor skin problems during hospitalization for another disease then a first visit regarding the skin disease to the patient's usual GP was often recommended. Second, the variation that aroused in the production (comparing different days and weeks) were reduced. Scheduling with longer time-horizons, based on the patient's need, reduced variation and improved efficiency. Third, patient care was optimized by focussing on value-added activities for each patient and by developing and using clear guidelines. Follow-up visits were only arranged if they added value for the patient. Instead, other ways to communicate with the patients increased, for example letters, phone calls and internet information. Enough times were then available for new patients. Other general elements in the improvement work were personnel training, cross-functionality and commitment from department managers.

Clinic staff's efforts were evaluated by measuring patients waiting for their first visit. Figure 2 shows dramatic decreases in waiting times. No patient waited more than three months for a first visit since the clinic reached its breakthrough in 2005. Improvement work is described in Jacobsson *et al.,* (2005).

Figure 1: Outpatients receiving their first-visit within three months from referral to the Rheumatology Department

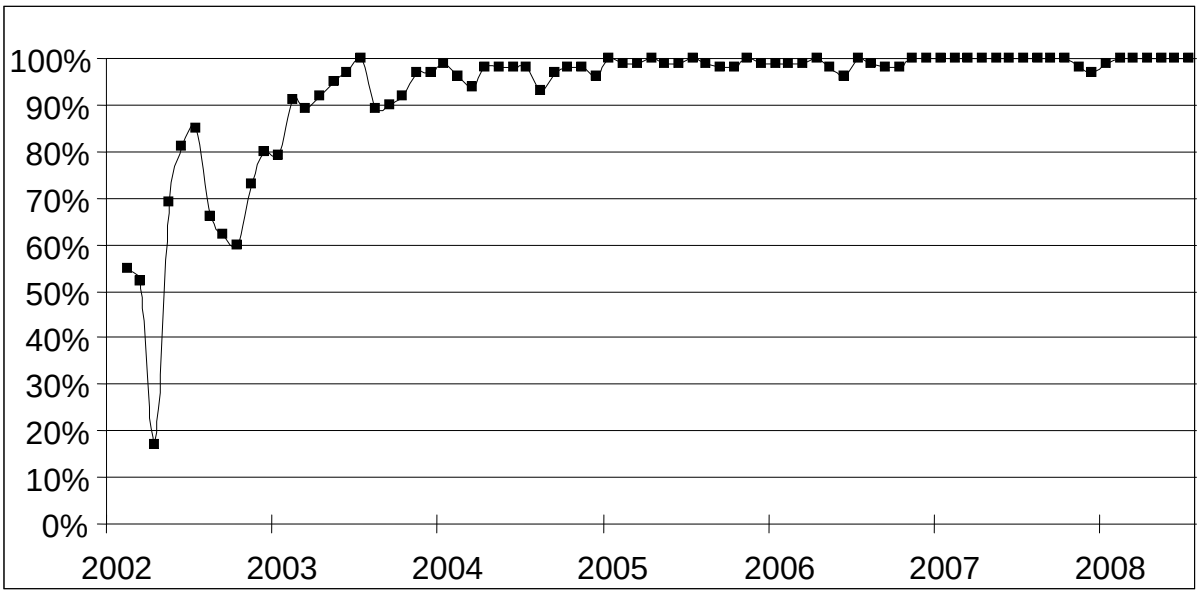
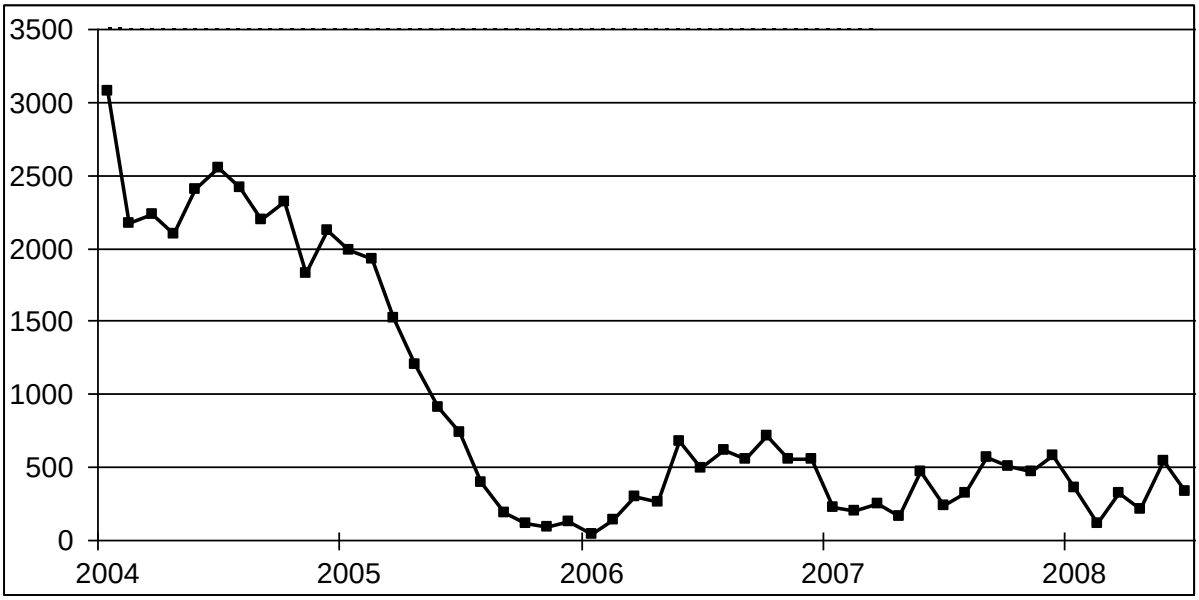


Figure 2: Referred patients waiting for a first visit to the Dermatology and Venereology Department.



Discussion

We have described an alternative to the failed approach of continually adding capacity or extensive structural reorganisation. As our study participants found, when analyzing the problem, that reduced capacity was not the main issue. Our method emphasises the need to properly understand and manage patient flows, and to match demand and capacity. Effective waiting list management enables healthcare providers to reduce lost capacity and to help patients receive the right examination at the right time. It is difficult for others to replicate the interventions that we have used, because one needs to adjust the method to the context and problem that exist at one's home department.

Even though staff in the two selected clinics initiated their improvements at different times, there are many similarities between selected strategies. Generally, clinic staff used the same methods and tools, including: process mapping and performing different PDSA cycle improvements (Deming, 1986). Moreover, clinic staff participated in different Breakthrough Series efforts. Quality improvement collaborations are increasingly used in many countries to rapidly improve healthcare. There are different multi-organizational collaborations that use quality improvement methods. Most aim to close the gap between potential and actual performance by testing and implementing changes quickly and across many organizations. A well-known approach is the Breakthrough Model developed by the Institute for Healthcare Improvement (IHI), but there are variations (Øvretveit *et al*., 2002). One important lesson is that Breakthrough Collaboration is not enough for eliminating waiting lists but it is a good starting point. To achieve long-lasting results with the intended improvement, a more thorough and deep understanding is necessary among, not least, managers.

One important ethical issue considered by clinic staff before initiating improvement work was the balance between first and re-visits. It would be easy to eliminate queuing by not offering re-visits or by significantly decreasing them. Hence, Rheumatology staff tracked whether scheduled re-visits are medically appropriate (Figure 3). Dermatology and Venereology staff continuously monitor the balance between first and re-visits (Figure 4). Figures 3 and 4 shows improved accessibility for first-visit outpatients has not had a negative impact upon outpatient re-visits.

Figure 3: Rheumatology patients getting their re-visits performed the month for which it was originally planned.

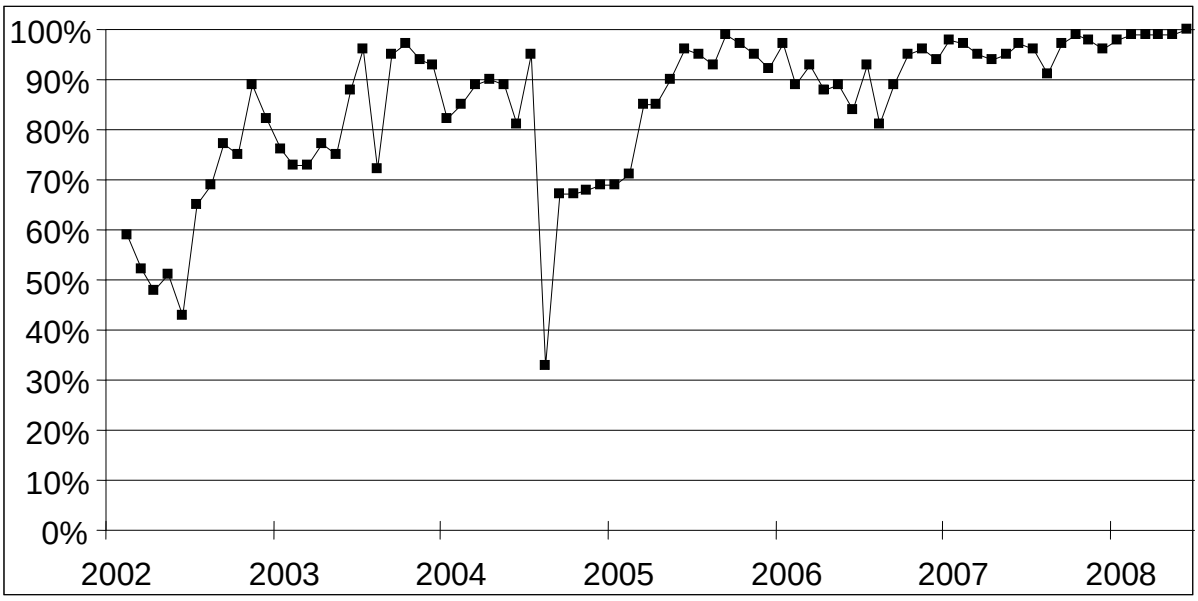
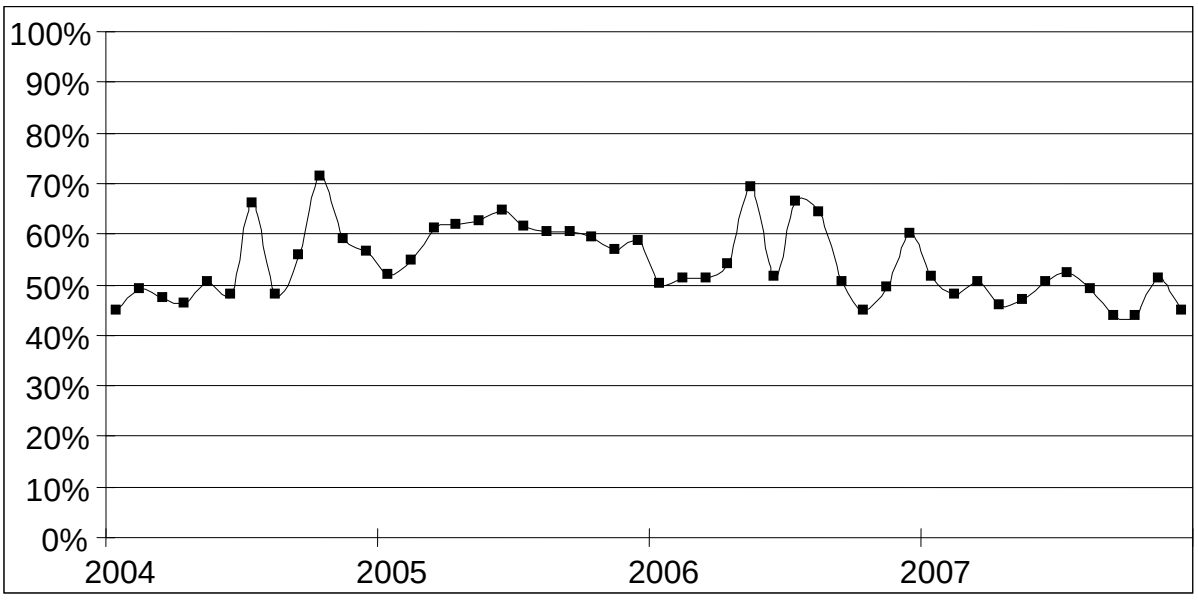


Figure 4: Dermatology and Venereology first-visit patients in relation to total outpatient attendances.



One big challenge in any improvement work is to engage healthcare professionals in quality improvement activities. Certainly, all staff levels and disciplines must be involved in process redesign. Even if healthcare employees are concerned about giving every patient the best care they are often sceptical about quality improvement concepts and methods. A reason for this could be that healthcare employees, especially physicians, perceive that initiatives will be ineffective and a waste of scarce personal and organizational resources. To get healthcare employees deeply involved, therefore, it is important to show that improvement projects work. We noticed that it is crucial that department heads follow-up the results and shows interest. Inspirations from other healthcare professionals who present their results can also trigger improvements among others. When the first Rheumatology Department team showed their favourable results they were given much local and

national attention. Other clinic staff, including the Dermatology and Venereology Department, were inspired and started to gain interest in quality improvements.

Conclusions

Waiting times are an important healthcare issue. We have illuminated waiting times for a first-visit to specialist services. We show how waiting lists can be reduced without adding more resources to the system, which is the normal way to deal with the problem. Our improvement work at Sahlgrenska University Hospital included gaining knowledge about accessibility, monitoring demand and capacity variations, improving patient processes by reducing variations, gaining management commitment and involving everyone (especially physicians). The end result is that accessible healthcare is possible by just paying more attention to existing solutions.

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